

# UK Patent Application GB 2 322 184 A

(43) Date of A Publication 19.08.1998

(21) Application No 9703162.9

(22) Date of Filing 15.02.1997

(71) Applicant(s)

Acrokool Limited  
(Incorporated in the United Kingdom)  
Unit 1, The Shires, Shirehill Industrial Estate,  
Thaxted Road, SAFFRON WALDEN, Essex, CB11 3AN,  
United Kingdom

(72) Inventor(s)

Roger Barry Moore

(74) Agent and/or Address for Service

Britter & Co  
Barn West, The Dixies, High Street, Ashwell,  
BALDOCK, Hertfordshire, SG7 5NT, United Kingdom

(51) INT CL<sup>6</sup>  
F25D 23/12, F25B 21/02, F25D 31/00, H01L 35/28

(52) UK CL (Edition P)  
F4H HG13  
H1K KTQ K6A1 K6T1

(56) Documents Cited  
WO 97/38661 A1 US 5493874 A US 5315084 A  
US 3808825 A

(58) Field of Search  
UK CL (Edition P) F4H HG13 H3, H1K KTQ  
INT CL<sup>6</sup> F25B 21/02, F25D 23/12 31/00, H01L 35/28  
35/30  
ONLINE DATABASE:WPI

(54) Abstract Title

Heating and cooling units

(57) A heating and cooling unit for use for example as a baby bottle cooler, warmer and/or steriliser, comprises a cooling chamber with associated cooling means and a heating cell (31) with associated heating means (33) eg a silicone matt heater. The heating cell (31) is removably receivable within at least part of the cooling chamber (1), to perform its heating function. The cooling chamber may be in the form of two sub-chambers each shaped to receive a bottle or a food container. The cooling chamber includes an external rear wall to which a Peltier cooling device is mounted. Cooling air is forced through slotted vents (23) in the rear wall. The heating cell (31) may be used to heat water to generate steam for warming or sterilising a bottle or food container.

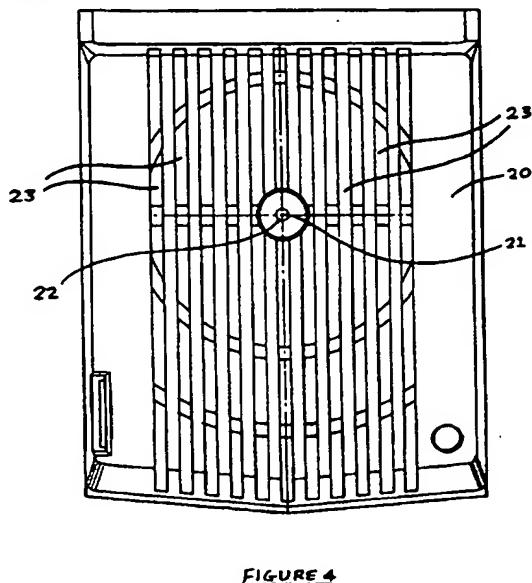


FIGURE 4

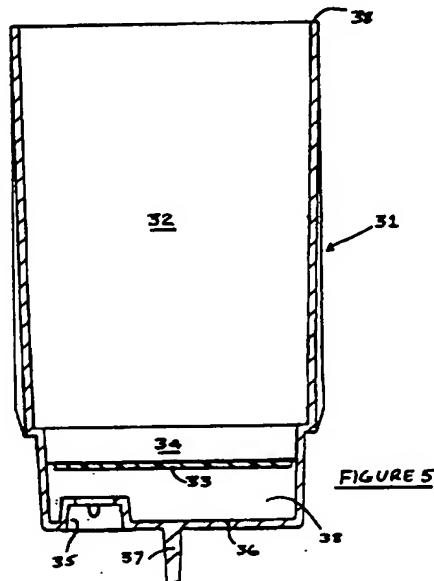


FIGURE 5

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

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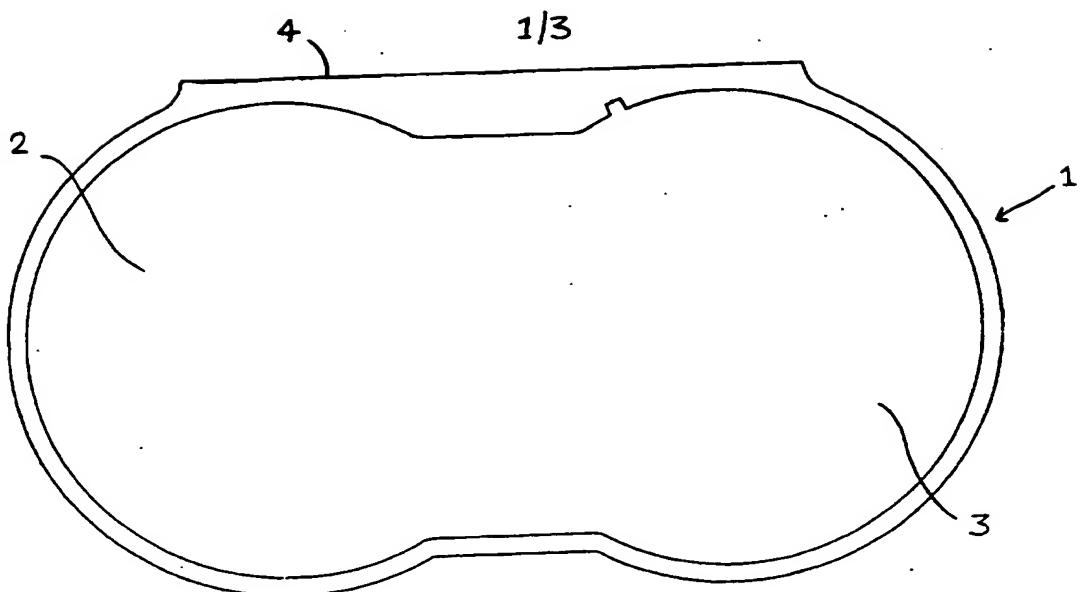


FIGURE 1

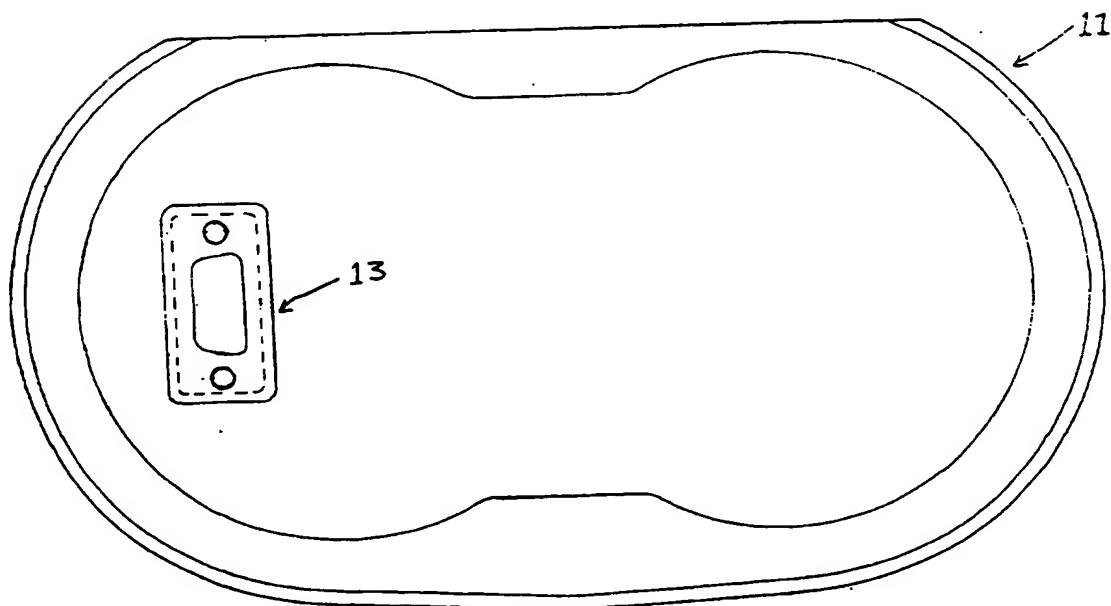


FIGURE 2

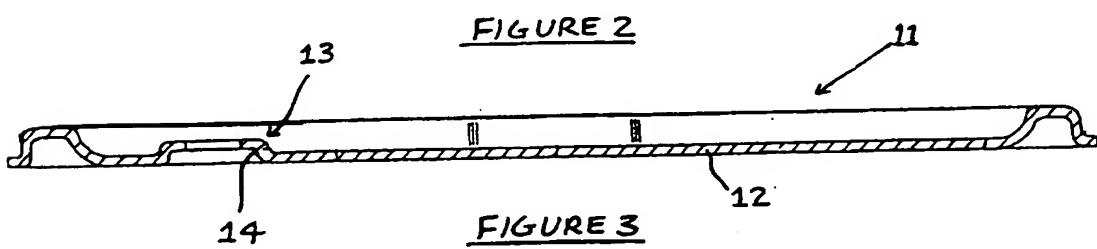


FIGURE 3

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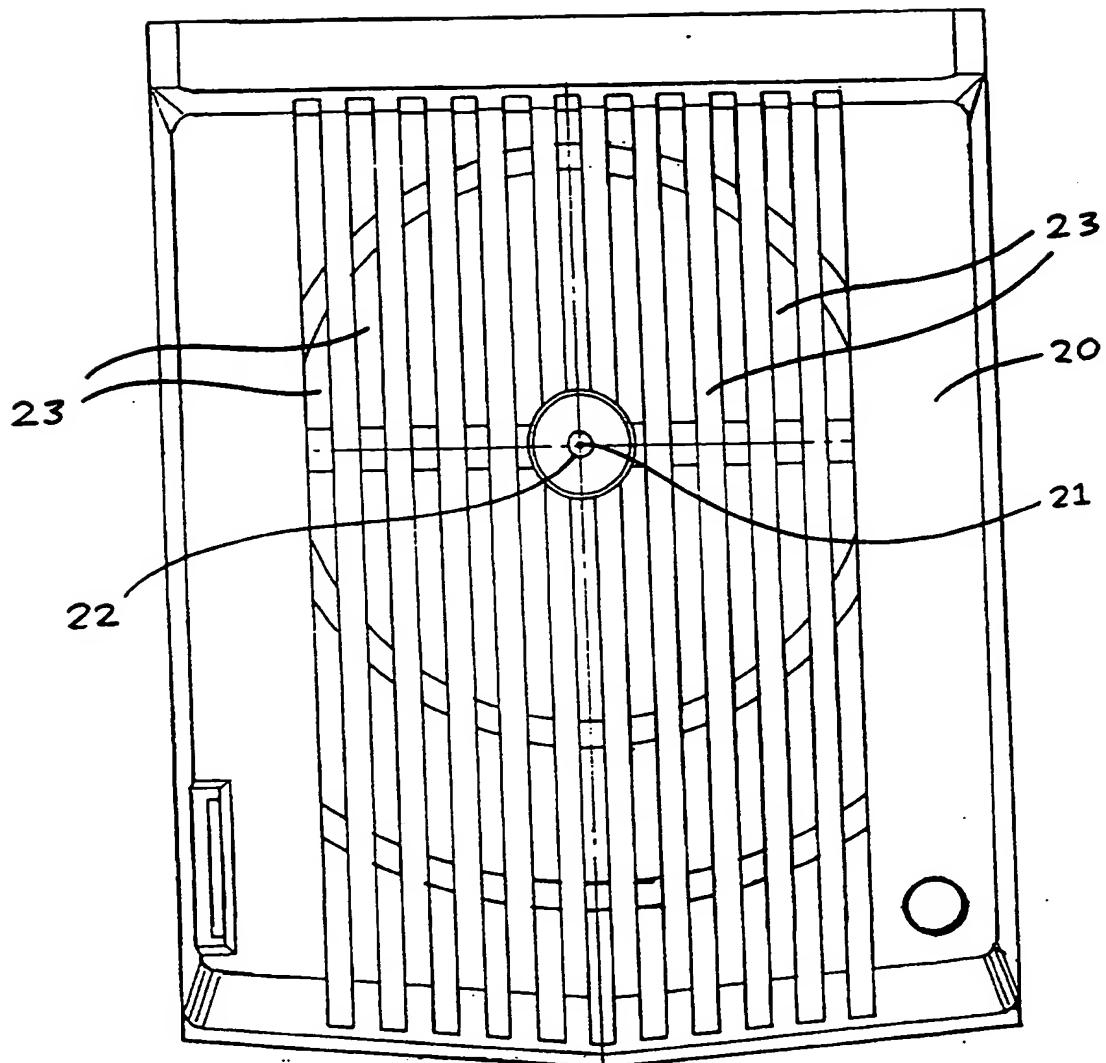
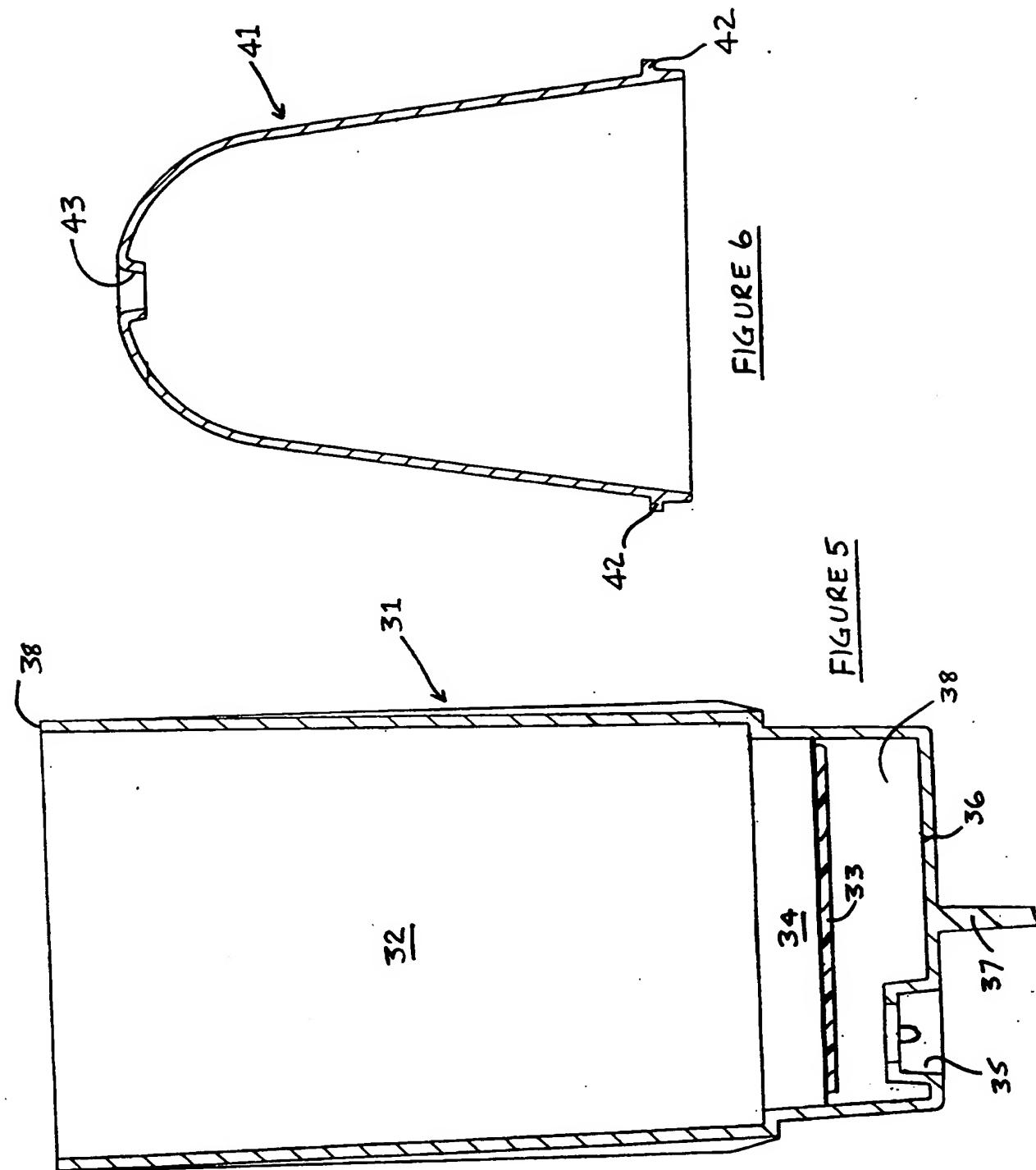


FIGURE 4

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THERMAL TREATMENT APPARATUSDESCRIPTION

5        This invention relates to thermal treatment apparatus and is especially, but not exclusively, related to such apparatus for cooling and heating comestibles.

10       In a known form of thermal treatment apparatus for cooling and heating the contents of, say, infant feeding bottles or other containers, there is provided a first, cooling chamber in which a container, such as an infant feeding bottle, can be received for cooling 15       the contents thereof and a second, heating chamber in which a container, such as an infant feeding bottle, can be received for heating the contents thereof, the first and second chambers being physical separate from each other. In some of these known types of thermal 20       treatment apparatus, the first, cooling chamber is provided with cooling means and a heat sink and/or other heat transfer means for transferring heat extracted by the cooling means from the cooling chamber and its contents to the second, heating 25       chamber.

These known types of thermal treatment apparatus are, thus, somewhat cumbersome in that two physically separated chambers, namely, the cooling and heating chambers, are necessary. A further disadvantage 30       resides in the inefficient transfer of heat from the cooling means associated with the cooling chamber to the heating chamber.

35       It is an object of the present invention to

provide thermal treatment apparatus which overcomes, or at least substantially reduces, the disadvantages associated with the known types of thermal treatment apparatus described and discussed above.

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Accordingly, the invention resides in thermal treatment apparatus comprising a cooling chamber with associated cooling means and a heating cell with associated heating means,

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wherein the heating cell is removably receivable within at least part of the cooling chamber, to perform its heating function.

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The shape and dimensions of both the cooling chamber and heating cell may be such as to receive therein containers, whose contents are to be cooled and/or heated, such as warmed, by the apparatus, of substantially the same shape and dimensions. Also, the heating cell may be arranged to sterilise, preferably with steam, an article, such as a food or drinks container, received therein.

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In the preferred embodiment of thermal treatment apparatus in accordance with the invention to be discussed in more detail hereinbelow, the cooling chamber comprises two sub-chambers each arranged to receive therein a container whose contents are to be cooled. At least one of those sub-chambers is also arranged to receive therein the heating cell.

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When the heating means associated with the heating cell received within the cooling chamber, is operable, so that the heating cell can perform its heating and/or sterilising function, the cooling means

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associated with the cooling chamber may be either operable or inoperable.

5 The inventive thermal treatment apparatus is preferably electrically-powered, with the cooling means associated with the cooling chamber being so powered. Similarly, the heating means associated with the heating cell, when received in the cooling chamber, is also electrically-powered in which case, 10 complementary plug-in electrical connectors may be provided in the cooling chamber and on the heating cell, so that the associated heating means can be connected to the electrical power supply, when the heating cell is received within the cooling chamber.

15 In the preferred embodiment, the cooling means for the cooling chamber comprises a Peltier effect device which is preferably mounted upon an exterior wall of that chamber in efficient thermal transfer contact therewith. The cooling means, such as the 20 preferred Peltier effect device, may be provided with a heat sink for dissipating heat extracted from the cooling chamber into the atmosphere.

25 In the preferred embodiment, the cooling chamber is in the form of a generally tubular, aluminium extrudate accommodated within an external housing, with thermal insulation provided between adjacent side and base walls thereof.

30 The heating cell may be made of any suitable material, such as, a plastics or metallic material, and preferably incorporates its associated heating means for generating steam for performing a warming 35 and/or sterilising function.

The heating means is preferably a so-called "silicone matt" heater, although it may comprise any other suitable form of heater.

5        The thermal capacity of the cooling chamber may be sufficiently large that, when the heating cell is received therein and is performing its warming and/or sterilising function, the overall temperature of the cooling chamber is not increased to any significant  
10      degree, whether or not the associated cooling means is rendered operative or inoperative. In this manner, and when the heating cell is received in, say, a sub-chamber of the cooling chamber to perform its warming and/or sterilising function, the other sub-chamber of  
15      the cooling chamber is still capable of performing its cooling function.

In order that the invention may be more fully understood, a preferred embodiment of thermal treatment apparatus for cooling and/or warming the contents of a container, such as an infant feeding bottle, or sterilising such a container, will now be described by way of example and with reference to the accompanying drawings in which:

25        Figure 1 is a top plan view of a cooling chamber of the apparatus;

30        Figure 2 is a top plan view of a base for supporting the cooling chamber shown in Figure 1;

Figure 3 is a sectional view, in elevation, of the cooling chamber-supporting base shown in Figure 2;

35        Figure 4 is an elevational view of a rear casing

of the apparatus housing, cooling means and associated heat sink and transfer means;

5      Figure 5 is a sectional view, in elevation, of a heating cell for the apparatus; and

Figure 6 is a sectional view, again in elevation, of a lid for the heating cell shown in Figure 5.

10      A thermal treatment apparatus in the form of a portable unit for cooling and/or warming the contents of an infant feeding bottle (hereinafter referred to as a "baby bottle") or other similar container, such as a baby food container, or for sterilising such a 15 container comprises a cooling chamber in the form of a generally tubular, aluminium extrudate, as shown generally at 1 in Figure 1.

20      This cooling chamber 1 comprises two interconnected sub-chambers 2 and 3 each shaped and dimensioned to receive a baby bottle or baby food container (not shown).

25      This cooling chamber 1 comprises a generally planar, external rear wall 4 to which is mounted a Peltier effect cooling device (not shown) of conventional form.

30      Associated with that Peltier effect cooling device is a heat sink and transfer means, including a fan, accommodated within a vented housing shown at 20 in Figure 4. The rotational axis 21 of the heat extractor fan is mounted in a bearing arrangement 22 provided in the outer rear wall of the casing 20.

Slotted vents 23 in that rear casing wall allow heat extracted from the cooling chamber 1 by the Peltier effect cooling device to be dissipated into the atmosphere.

5

In Figures 2 and 3, there is shown a base 11 for supporting the cooling chamber 1 within an exterior plastics housing (not shown) to which is mounted the rear casing 20.

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Suitable thermal insulation (also not shown) is provided between the side walls of the cooling chamber and the interior walls of the housing. Similarly, thermal insulation is provided between the bottom wall 12 of the cooling chamber-supporting base 12 and the interior base wall of the housing.

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That bottom wall 12 of the base 11 is provided at 13 with a raised portion and associated recess 14 to which can be mounted a suitable electrical connector.

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A heating cell, indicated generally at 31 in Figure 5, comprises an upper portion 32 which is shaped and dimensioned to receive therein a correspondingly shaped and dimensioned baby bottle. A lower portion 38 of the heating cell 31 houses circuitry for a silicone matt heater 33 adhered at the underside of an intermediate portion 34 arranged to receive therein a volume of water from which steam can be generated when the heater 33 in the lower portion 38 is operative. The so-generated steam may be used to warm the contents of a baby bottle or baby food container or to sterilise the bottle or other container.

A recess 35 associated with the bottom wall 36 of the heating cell 31, has mounted therein another electrical connector (not shown) which is complementary with that of the base 11 shown in 5 Figures 2 and 3.

In this manner, and when the heating cell 31 is removably received within the sub-chamber 2 of the cooling chamber 1, the complementary electrical 10 connectors are connected together, so that electrical power can be provided to the silicone matt heater 33.

The bottom wall 36 of the heating cell 31 has a spigot 37 depending therefrom and arranged to engage 15 within a corresponding socket associated with the sub-chamber 2 of the cooling chamber 1, to locate the heating cell 31 correctly therein.

The heating cell 31 is provided with a lid, as 20 indicated generally at 41 in Figure 6, having an annular lip 42 which is arranged to locate upon the uppermost edge 38 of the heating cell 31.

The lid 41 is provided with a vent 43, to allow 25 the escape of steam from the interior of the heating cell 31 when its associated heater 33 is operative, so that the heating cell 31 can perform its warming or sterilising function.

In this preferred embodiment, means are provided 30 to render the cooling means of the cooling chamber 1 inoperative when the heating cell 31 is received in the sub-chamber 2 and is performing its warming or sterilising function. However, as an alternative, the 35 cooling means may be maintained operative, in such a

situation.

5        The thermal capacity of the cooling chamber 1 can be sufficiently large, such that, when the heating cell 31 is received in the sub-chamber of the cooling chamber 1 and is performing its warming or sterilising function, the temperature within the sub-chamber 3 is not increased to any significant extent, this being particularly so if the cooling means is maintained 10      operative.

15      In this manner, the heating cell 31 can be used to warm or sterilise a baby bottle or baby food container with steam, whilst another baby bottle or baby food container and its contents are kept cool in the sub-chamber 3 of the cooling chamber 1.

20      The Peltier effect cooling means is capable of maintaining the temperature within the cooling chamber 1 at approximately 10°C and, when the heating 31 is in use in the sub-chamber 2, the temperature within the sub-chamber 3 need only rise by a few degrees Celsius.

25      Adjustable timing means may be provided to render the heating cell 31 operative for predetermined time periods, such that the steam warming of a baby bottle or baby food container brings the temperature of the contents of that bottle up to the required temperature.

30      Such timing means or additional timing means may be employed to render the heating cell 31 operative for predetermined time periods during sterilising of the baby bottle or other container.

The electrical supply to the unit may be sourced from a mains supply and/or the 12 volt battery of a vehicle.

5 Thus, it is to be appreciated that the thermal treatment apparatus of the invention, particularly when in the form of a portable unit such as that described above in relation to the preferred embodiment, provides a compact unit which can be used  
10 in many situations in any number of its three cooling, warming and sterilising functions.

Further, it is also to be appreciated that the heating cell can be used separately from the cooling chamber. For example, the heating cell could be used on its own, that is to say, remote from the unit or apparatus comprising the cooling chamber, with its heating means, whether in the form of the silicone matt heater 33 of the embodiment described above with  
15 reference to the drawings, or any other suitable electrical heater, subject to the heating means being provided with another source of electrical power.

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CLAIMS

1. Thermal treatment apparatus comprising a cooling chamber with associated cooling means and a heating cell with associated heating means,  
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wherein the heating cell is removably receivable within at least part of the cooling chamber, to perform its heating function.

10 2. Apparatus according to claim 1, wherein the shape and dimensions of the cooling chamber and heating cell are such as to receive therein containers whose contents are to be cooled and/or heated by the apparatus and whose shape and dimensions are substantially the same as those of the cooling chamber and heating cell.  
15

20 3. Apparatus according to claim 1 or 2, wherein the heating cell is arranged to sterilise a container received therein.

25 4. Apparatus according to claim 3, wherein the heating cell is arranged to sterilise a container received therein with steam.

30 5. Apparatus according to any preceding claim, wherein the cooling chamber comprises two sub-chambers each arranged to receive therein a container whose contents are to be cooled.

6. Apparatus according to claim 5, wherein at least one of the sub-chambers is also arranged to receive therein the heating cell.

7. Apparatus according to any preceding claim, wherein, when the heating cell is received within the cooling chamber and said heating means associated with the heating cell, is operable, so that the heating cell can perform its heating function, said cooling means associated with the cooling chamber, is either operable or inoperable.

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8. Apparatus according to any preceding claim, wherein said cooling means associated with the cooling chamber, is electrically powered.

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9. Apparatus according to any preceding claim, wherein said heating means associated with the heating cell, when received in the cooling chamber, is electrically-powered.

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10. Apparatus according to claim 9, wherein complementary plug-in electrical connectors are provided in the cooling chamber and on the heating cell, so that said heating means can be connected to an electrical power supply, when the heating cell is received within the cooling chamber.

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11. Apparatus according to any preceding claim, wherein said cooling means of the cooling chamber comprises a Peltier effect device.

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12. Apparatus according to claim 11, wherein the Peltier effect device is mounted upon an exterior wall of the cooling chamber in efficient thermal transfer contact therewith.

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13. Apparatus according to any preceding claim. wherein said cooling means is provided with a heat

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sink for dissipating heat extracted from the cooling chamber into the atmosphere.

5 14. Apparatus according to any preceding claim, wherein the cooling chamber is in the form of a generally tubular, aluminium extrudate accommodated within an external housing, with thermal insulation provided between adjacent side and base walls thereof.

10 15. Apparatus according to any preceding claim, wherein the heating cell is made of a plastics or metallic material.

15 16. Apparatus according to any preceding claim, wherein the heating cell incorporates said associated heating means for generating steam for performing a warming and/or sterilising function.

20 17. Apparatus according to any preceding claim, wherein said heating means is a "silicone matt" heater.

25 18. Apparatus according to any preceding claim, wherein the thermal capacity of the cooling chamber is sufficiently large that, when the heating cell is received therein and is performing its warming and/or sterilising function, the overall temperature of the cooling chamber is not increased to any significant degree, whether or not the associated cooling means is rendered operative or inoperative.

30 35 19. Apparatus according to claim 18 when dependent upon claim 5 or upon any of claims 6 to 17 when dependent upon claim 5, wherein, when the heating cell is received in a sub-chamber of the cooling chamber to

perform its warming and/or sterilising function, the other sub-chamber of the cooling chamber is still capable of performing its cooling function.

5 20. Thermal treatment apparatus substantially as hereinbefore described with reference to the accompanying drawings.



**Application No:** GB 9703162.9  
**Claims searched:** All

**Examiner:** M C Monk  
**Date of search:** 2 June 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.P): F4H (H3, HG13); H1K (KTQ)

Int CI (Ed.6): F25B (21/02); F25D (23/12, 31/00); H01L (35/28, 35/30)

Other: ONLINE DATABASE:WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage		Relevant to claims
A	US 5493874	MARK A. LANDGREBE Removable heating pack (34).	1
A	US 5315084	MARTIN JENSEN Consider whole document.	1
A	US 3808825	THE RAYMOND LEE ORGANIZATION Consider whole document.	1
XE	WO 97/38661 A1	JEAN PACAULT WPI Abstract Accession No 97-526182/ 199748. Halogen lamp (10) may be removable.	1 at least

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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